

WHAT IS CLAIMED IS:

1. A process for making an *in vivo* model of human leukemia comprising
  - a) pre-conditioning an immunodeficient rodent by administering to the rodent a sub-lethal dose of irradiation and injecting the rodent with an effective pre-conditioning amount of mononuclear cells derived from human fetal cord blood;
  - b) maintaining the rodent from step (a) for from about 5 to 10 days; and
  - c) injecting the rodent from step (b) with an effective engrafting amount of primary human leukemia cells.
2. The process of claim 1 wherein the immunodeficient rodent is an immunodeficient mouse.
3. The process of claim 2 wherein the immunodeficient mouse is a NOD/scid mouse.
4. The process of claim 1 wherein administering the sub-lethal dose of irradiation is accomplished by irradiating the rodent with about 350 rads of total body gamma radiation.
5. The process of claim 1 wherein the effective engrafting amount of primary human leukemia cells is from about  $10^6$  to about  $10^7$  cells.
6. The process of claim 1 wherein the primary human leukemia cells are T-cell acute lymphoblastic leukemia (T-ALL) cells.
7. The process of claim 1 wherein the effective pre-conditioning amount of human fetal cord blood mononuclear cells is from about  $10^6$  to about  $10^8$  cells.
8. The process of claim 1 wherein the mononuclear cells are stem cells.
9. The process of claim 8 wherein the stem cells comprise mesenchymal stem cells.

10. The *in vivo* model of human leukemia produced by the process of claim 1.
11. An immunodeficient rodent having engrafted human leukemia cells.
12. The rodent of claim 11 wherein the leukemia-initiating cell is maintained within the leukemia-engrafted rodent.
13. The rodent of claim 12 that is a mouse.
14. The mouse of claim 13 that is a NOD/scid mouse.
15. The rodent of claim 11 that is irradiated, injected with human fetal cord blood mononuclear cells and then injected with human primary leukemia cells.
16. The rodent of claim 11 wherein the engrafted leukemia cells are found in the bone marrow and spleen of the rodent.
17. A process for making an *in vivo* model of human leukemia comprising
  - a) pre-conditioning an immunodeficient rodent by administering to the rodent a sub-lethal dose of irradiation and injecting the rodent with an effective pre-conditioning amount of stem cells derived from bone marrow;
  - b) maintaining the rodent from step (a) for from about 5 to 10 days; and
  - c) injecting the rodent from step (b) with an effective engrafting amount of primary human leukemia cells.